

Innovative Technology Transfer Partnerships

At John F. Kennedy Space Center

Instrumentation Systems Development

Orbiter Tire Pressure Monitor (TPM)

John F. Kennedy Space Center

SPACEPORT
ENGINEERING AND
TECHNOLOGY

■ **NASA's mission**

- To understand and protect our home planet
- To explore the universe and search for life
- To inspire the next generation of explorers
... as only NASA can

■ **Technological innovation and collaboration**

- Create a more secure world and improve quality of life
- Enable capabilities

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TECHNOLOGY TRANSFER PROGRAM

■ New Mission Statement

- Create partnerships with industry, academia, and other government agencies to develop and transfer technology in support of the NASA Enterprises.

■ New Goals

- Reduce NASA technology development life-cycle costs.
- Transfer technology in support of the NASA mission.
- Enhance NASA mission technology capabilities.

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WHAT NASA OFFERS

■ Access

- Technologies (IP ownership)
- Capabilities and other assets
- Development and testing (reduced risk of failure)

■ Partnership

- Various vehicles: Space Act Agreements, SBIR, licenses, and more
- NASA R&D contractors, universities, and other companies

■ Multifaceted teams to coordinate collaboration

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Innovative Technology Transfer Partnerships



■ What We Do

- **Spin-out:** Introduce NASA innovations into external sectors (business and industry, academia, other government)
- **Spin-in:** Identify innovations in the external sector that facilitate NASA R&D (achieving our missions faster and more efficiently)

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■ Focus of instrumentation systems development

- Transducer Development
- Hazardous Gas Detection
- Contamination Monitoring
- Testing and Installation of KSC facility systems

■ Technologies

- Orbiter Tire/Strut Monitor
- Airborne Volcanic Emissions Mass Spectrometer
- Wireless External Tank Center of Alignment

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■ Project requirements

- Requirements call for performing accurate pressurization and pressurization decay tests (leak tests) to tires and struts.
- Requirements call for identifying any leak paths during ground processing before the Orbiter is ready for flight.

■ Instrument requirements

- Pressure range from 14.7psia to 500 psia.
- Detecting 0.1-psi pressure changes at that pressure range.
- Accurate within a temperature range from 20°F to 120°F.
- Minimize the instrument high pressure volume, thus reducing the risk of personal injury to the operator.

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Project approach

- Design utilizes:
 - Small, highly accurate pressure and temperature sensors;
 - Optimum mechanical interface between the tire/strut valve and the sensors;
 - Compact, hand-held electronics unit that provides rapid, reliable pressure/ temperature data display.

- Instrument sensing head attaches directly to the pressure supply/relief valve on the tire and/or the strut, with the electronics contained in a hand-held enclosure connected by means of a six (6) foot instrumentation cable.
 - Keep the operator at a reasonable distance from the tire or strut.

- Places instrument as close to the tire or strut measurement location.
 - Allows to make accurate measurements.
 - Minimizes the length of high-pressure lines or volumes.

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Project approach

- The pressure measurement portion of the proposed system centers on a small, highly accurate pressure sensor capable of delivering pressure measurements repeatable to within 0.03 pounds per square inch absolute (PSIA).
- Temperature compensation and correction is required to maintain this tight tolerance through out the wide operating temperature range.
- The complete pressure sensor assembly, housed in a stainless steel enclosure, contains the pressure sensor, a temperature sensor and electronics for precision excitation to the pressure sensor and amplification of pressure and temperature measurements.
- The sensing unit housing, fittings and unit's orientation were designed to allow for easy installation and removal by technicians.

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Project approach

- The hand-held device can be powered by 12-VAC or by 9-VDC batteries.
- Electronics provide supply voltage to the sensing unit electronics, as well as low pass filtering and analog-to-digital conversion of sensors measurements.
- The system includes smart software algorithms embedded in a micro-controller, utilizing complex conversion equations developed from pressure and temperature sensor calibration data.

National Aeronautics and
Space Administration

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SPIN OUT OPPORTUNITY:

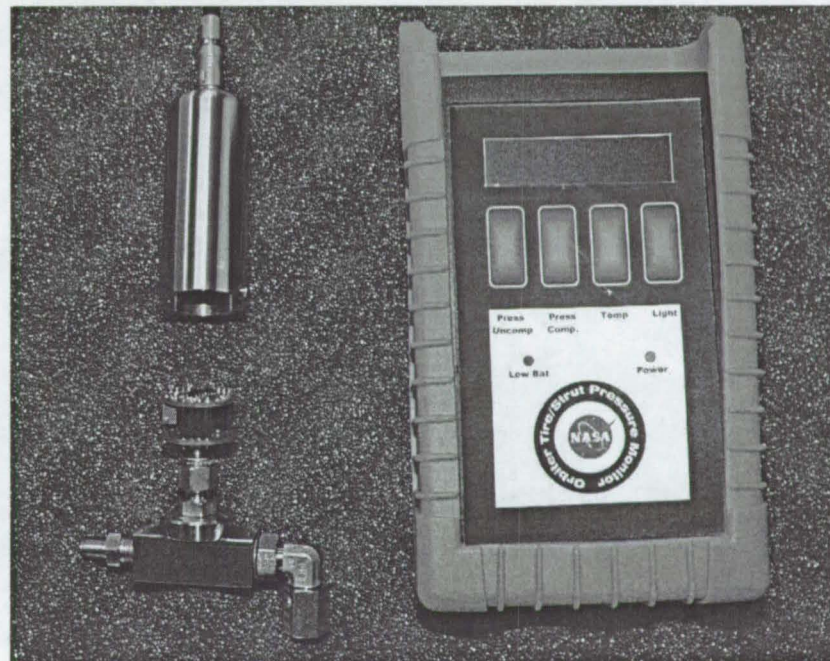
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technology from NASA please
contact:

Brian Sauser

Technology Transfer Agent

321-861-7157

brian.sauer-1@ksc.nasa.gov



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